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**Teaching Children with Autism to Mand from Their Peers**

By

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B.S. Guilford College, 1997

M.S. University of Southern Maine, 2008

A DISSERTATION PROPOSAL

Submitted in Partial Fulfillment of the

Requirements for the Degree of

Doctor of Psychology

(in School Psychology)

The University of Southern Maine

May, 2016

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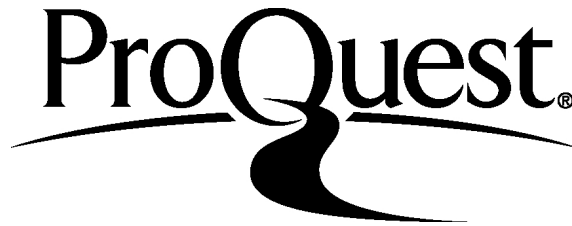
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*Michelle Hathaway*

Michelle Hathaway  
May 2016

# **Teaching Children with Autism to Mand from Their Peers**

Michelle Hathaway, M.S.

Dissertation Chairperson: Rachel Brown, Ph.D.

An Abstract of the Dissertation Presented  
in Partial Fulfillment of the Requirements for  
the Degree of Doctor of Psychology  
(in School Psychology)

University of Southern Maine

May, 2016

Although the severity of social communication and social interaction deficits can range significantly in children identified with autism, many children identified with autism fail to develop effective communication repertoires. Many current instructional practices focus on teaching children with autism to communicate with adults, without providing explicit opportunity for the generalization of these communication skills toward their same-age peers. This study evaluated an intervention designed to increase the independent mands of children with autism to same aged peers, within an inclusive pre-school setting. The intervention provided opportunities for children with autism to participate in multiple sessions with peer coaches who had been trained to provide a specific prompt sequence in order to increase the mand behavior of the children with autism. A multiple baseline design was utilized with three children with autism and four peer coaches, over a seven-week period. Results of the study indicate that all three

children with autism increased their abilities to mand for a variety of toys from their peers during instructional sessions. In addition, two of the three participants displayed an increase in their ability to independently mand for toys from peers within the natural environment setting (pre-school classroom). These results indicate that children with autism can benefit from efforts to increase their functional language and communication with peers.

## ACKNOWLEDGMENTS

I would like to thank Dr. Rachel Brown and Dr. Mark Steege for the years of mentorship, patience, guidance and steady support. I have learned a tremendous amount from you both, and am indebted to you for my academic advancement and for my greater understanding of the field that we are so passionate about.

I would like to thank my dissertation committee, Dr. Rachel Brown, Dr. Elizabeth Cameron, Dr. Kim Labbe-Poisson and Dr. Mark Steege, for the encouragement and insight that you have provided throughout this process.

Dr. Kim Labbe-Poisson, you helped me to find balance this year and offered me the guidance and support I needed to find my own voice as a clinician. You gave me “just what I needed” and I appreciate this so very much. I have long admired the clinician you are and am so grateful for the mentor that you have become to me. Thank you!

I would like to thank my MMCC/USM cohort, Russell Brown and William Roy. The three of us have proven to be a mighty trio and I can’t imagine fumbling through this without you. Friendly competition, much needed support and bouts of laughter have carried us through...thank you!

Special thanks to the staff at the Margaret Murphy Centers for Children....this journey would have been never-ending if I was not given the ongoing privilege of working alongside the most talented and amazing group of educators and clinicians in the State of Maine. Thank you for holding steady in



your pursuit of daily excellence, allowing me to commit fully to my clinical work this year.

Finally, but of utmost importance, thank you to my family! To “my boys”, my husband Michael and our three sons, Wyatt, Sawyer and Jackson, I AM DONE! Thank you for your support and your encouragement along the way. Remember my baby boys, the sky is the limit! I hope that I have set an example for you and that you dig down deep one day to reach your own goals. It is not easy, but the rewards are many. To my parents, Sandy and Donald, my in-laws, Bambi and Larry, and my two sisters, Jenny and Lori, really and truly, I would not have finished this without you...you have helped out so many times, in so many ways....thank you!

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## CHAPTER 1: INTRODUCTION AND LITERATURE REVIEW

In 2010, The Centers for Disease Control and Prevention Autism and Developmental Disabilities Monitoring (ADDM) Network reported that autism had a current prevalence rate of 1:68 children within the United States, stating that this newly reported rate is a continuing *urgent* public health concern. This prevalence rate has skyrocketed from a 1992 CDC Report that identified 1:150 children with autism (Centers for Disease Control and Prevention, 2010) as well as from earlier decades when autism was identified in children with a prevalence of 1:10,000.

Autism Spectrum Disorder (ASD), as defined in the most recent edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5; American Psychiatric Association, 2013) is a neurodevelopmental disorder characterized by deficits in social communication and social interaction skills, paired with restricted and repetitive patterns of behavior, interests, or activities (DSM-5). Although the severity of social communication and social interaction deficits can range significantly in children identified with autism, for about 50% of children identified with autism these deficits include a failure to develop functional vocal communication (Bailey, Phillips, & Rutter, 1996).

Extensive research has been generated in the last several decades regarding the importance of early and intensive intervention for children with autism. A review of research in the 1990s about interventions for children with autism noted that, “the behavioral approach in general has been much more effective than those based on psychoanalysis, holding therapy, auditory training, sensory integration, swimming with

dolphins, weighted jackets, vitamin therapy and others (Jacobson, Mulick and Green, 1998, p. 213). In the last decade, the American Academy of Pediatrics (Maglione, Gans, Das, Timbie, & Kasari, 2012) and the Centers for Disease Control and Prevention (2015) have endorsed ABA as the appropriate and most effective intervention for children with AUTISM. Multiple, independent state task force committees have been developed to identify promising treatment practices for children with autism. These committees, from states such as Massachusetts, New York and Maine have all identified ABA programming to be highly effective, evidence-based and most favorable in long-term outcomes for children with autism.

Fenske, Zalenski, Krantz and McClannahan (1985) identified through their research in the 1980s and 1990s that some children with autism were able to be fully and successfully integrated into mainstream educational programming following extensive and intensive behavioral programming and interventions. However, even intensive behavioral interventions might be considerably less successful with some children than term progress should not be surprising given the host of factors that might impact long-term prognosis, including, but not limited to, co-existing disabilities, severity of the characteristics of autism, intensity and frequency of behavioral services received, quality of services, age of the child at the onset of intensive services and service disruption. Much work and research continues to be done throughout the country, at sites such as the New England Center for Children, Alpine Learning Institute, Princeton Child Development Institute and the Margaret Murphy Centers for Children to continue to improve teaching techniques and subsequent, long-term student outcomes.

The nature of behavioral programming, specifically the use of Applied Behavior Analysis (ABA), can be defined best in the words of Baer, Wolf, and Risley. In 1968, the trio provided the definition for Applied Behavior Analysis to include the process of systematically applying interventions based upon learning theory, with the intent of increasing socially significant behaviors. Through systematic implementation, Baer, Wolf and Risley documented the validation of the science as evidenced by increases in meaningful behaviors directly tied to ABA.

Specifically, ABA involves the principles of learning theory. It is the contingent use of reinforcement and other important principles to increase behaviors, generalize learned behaviors or reduce undesirable behaviors that are fundamental to ABA programming and application. There are many different teaching strategies that are used under the umbrella of ABA. These include (a) shaping and chaining behaviors, (b) specific teaching strategies such as discrete trial instruction, (c) pivotal response training, (d) incidental teaching, (e) fluency-based instruction and many more. Each of these instructional techniques has a strong empirical base of research to support its use.

The most important component of ABA involves the goal of increasing “socially significant behaviors to a meaningful degree (Baer, et. Al., 1968).” It is imperative that intervention programs focus on outcomes for the learners that will have socially significant consequences and that this change is meaningful for the individual with autism and his or her family and friends. A core component and instructional focus of behavioral programming for children with autism should be on the acquisition and

increase of functional communication. When possible, the focus should be on increasing functional verbal communication.

Research indicates that the inability to spontaneously communicate wants or needs may result in the acquisition of inappropriate, unconventional forms of “requesting” such as aggressive or tantrum behavior (Carbone, 2013). If a child is unable to say “pizza” when hungry, he may learn to hit or to grab at the pizza in order to obtain it. Children who exhibit these types of behaviors, instead of more functional communication abilities, may have fewer opportunities to interact with more typically developing children. For example, children who exhibit aggressive behaviors are typically excluded from play dates, community activities and non-specialized programs (Charlop, Schreibman, & Thibodeau, 1985).

Teaching functional and spontaneous communication to children with autism should be a priority. To achieve this goal, specific behaviors that are socially meaningful and relevant, and that will increase independence while simultaneously decreasing the potential for acquired maladaptive behaviors, need to be the focus of instructional programs. Established intervention programs and professionals have increasingly recognized the importance of early, intensive efforts toward teaching functional communication to individuals with autism. The combined published works and national training efforts provided by Bondy and Frost of Pyramid Education Inc. (2001), Carbone (2013), Hall (2007) and Sundberg (2005) have had significant impact on professional understanding of, and competency in, delivering early behavioral programming designed to increase functional communication.



However, while Applied Behavior Analysis (ABA) has been utilized for many years, and across the domains of speech and language pathology, education, and special education, “the failure to make much use of the technical concepts and principles that appear in B.F. Skinner’s (1957) *Verbal Behavior* seems inconsistent with the stated behavioral focus of many current intervention programs” (Sundberg & Michael, 2011, p. 703). Sundberg and Michael, students of Skinner, proposed that many current ABA programs make almost no use of the concepts, terms, and analyses that appear in Skinner’s *Verbal Behavior* and assert that many practitioners and intervention programs are implementing programming that utilizes an incomplete version of ABA. Sundberg and Michael called for a much more intensive study of Skinner’s behavioral interpretation of language.

Skinner (1957) defined verbal behavior as behavior that is reinforced through the mediation of another person’s behavior. Sundberg and Michael (2011) pointed out Skinner’s extensive attention to the verbal behavior of the individual speaker and his belief that there are significant variables that control verbal behavior namely, motivative variables, discriminative stimuli, and the consequences that have followed that type of responding. In his 1957 work *Verbal Behavior*, Skinner described several types of verbal operants, including the mand, the tact, the echoic, intraverbal, textual, and the transcriptive. Sundberg and Michael (2011) focused on the mand, a type of verbal behavior where the response form is controlled by a motivative variable.

The mand, derived from the word command, is the use of language such that the words used are controlled by what the person wants. For example, a child wants pizza

and says “pizza.” Mands receive reinforcement *specific* to the particular mand. This is critical to understanding the application of reinforcement in mand acquisition. In this example, the mand for pizza is reinforced by receiving the pizza. The mand for pizza would not have been reinforced had the child been given broccoli. The mand is unique in that the other verbal operants (e.g., tact, intraverbal, etc.) typically receive nonspecific, generalized reinforcement, such as social attention, approval or termination of a demand of some sort (Sundberg and Michael, 2011). In simple terms, mands directly benefit the individual who is speaking because they result in access to delivery of desired reinforcers. Sundberg and Michael (2011) noted that the purpose of the mand is in contrast to all of the other verbal operants described by Skinner. The other operants, while important, do not result in direct benefit to the person. Given that the mand results in access to a desired tangible to the person, and allows the person the socially relevant and meaningful tools necessary to gain access to desired and primary items such as food and drink, evidence supports the critical need to teach students with autism the ability to mand.

Developmentally, research further substantiates the mand as the basis for early language development and describes the mand as the first type of verbal behavior that humans acquire (Bijou and Baer, 1965). The mand “gives the child some control over the social and the nonsocial environment, increasing value to the child of language training in general” (Sundberg and Michael, 2011, p. 705). This is compared to some language instruction programs that rely on expressive and receptive language teaching that provide instruction on random pictures or items, resulting in little value to the child.

The National Autism Center's meta-analysis investigating evidenced-based practices for children with autism Standards Report (2009) noted "mand training" as one of 11 "established" behavioral treatment packages. Some benefits of mand training include increased access to desired items (Hartman & Klatt, 2005; Taylor, Hoch, Potter, Rodriguez, Spinnato, & Kalaigan, 2005; Pellecchia & Hineline, 2007; Charlop, Schreibman, & Thibodeau, 1985), decreased problem behavior (Charlop-Christy, Carpenter, LeBlanc & Keller, 2002; Carr & Durrand, 1985), and increased social initiations (Pellecchia & Hineline, 2007; Taylor, Hoch, Potter, Rodriguez, Spinnato, & Kalaigan, 2005; Kodak, Paden, & Dickes, 2012). Of particular importance for young children with autism, research has indicated that the mand should be taught explicitly, with generalization efforts embedded within instruction, to be effective across a host of stimuli, communicative partners and varied settings.

Emerging research continues to demonstrate the difficulty that some children have in generalizing their ability to mand, including a recent study conducted by Sweeny-Kerwin, Carbone, O'Brien, Zecchin, and Janecky (2007) where authors noted "response generalization was not observed for any of the participants" (p. 94). For children with autism, peer relations will often fail to develop unless specifically taught (Charlop-Christy et al., 2002). In order to teach interactions with peers as having value, instructors must work to establish peers as conditioned reinforcers. This process will involve all of the same steps in establishing adults as conditioned reinforcers. Variables that commonly influence the success of interpersonal mand development for learners include issues with motivation, prompting procedures, and difficulties with generalization.

### **Instructional Needs of Students with Autism**

A related concern for children with autism is that they often do not have consistent and frequent opportunities to learn and to use manding skills with other peers. For children with autism, moderate to severe problem behaviors may significantly limit inclusion opportunities, social activities, and experiences with non-disabled peers (Charlop-Christy et al., 2002). If a young child who has acquired a limited ability to mand is placed within an unfamiliar setting, with increased stimuli, peers and adults, the challenges can be magnified and his/her ability to mand within this setting most likely will be reduced. Participation in natural and inclusive environments, such as schools, can be increased and more successful if children with autism are taught the specific necessary communication skills related to such environments.

Students with autism require instruction that prepares them to communicate more effectively within specific settings, so they can express their needs or desires to access preferred items using a functional communication system. For example, within an inclusive school setting, naturally occurring interactions between children can be supported through the use of favorite or preferred play items and positive reinforcement for negotiated turn-taking, sharing, relinquishment of items, and other pro-social behaviors. In order for children with autism to be successful in these interactions, and within such settings, they must be able to mand for a variety of items and from peers. Based on prior research, there are promising instructional methods that might benefit students with autism in acquiring and mastering the use of mands with peers. Nonetheless, such methods have rarely been empirically tested in applied school settings.

There is increased social validity in the research conducted within the classroom. The importance and relevance of this setting within the research design cannot be replicated for research conducted in laboratory settings. Although the Taylor et al. (2005) research was conducted in a classroom setting, the vast majority of similar research has been conducted in the clinical setting.

### **Teaching Procedures**

The strength of the prior research was addressed by Kittenbrink (2015), who noted that,

Researchers have found a repertoire of validated procedures for developing and strengthening complex mand skills in individuals presenting deficits in these specified areas. Recognizing the importance of developing manding skills, researchers have proposed a number of strategies for teaching and strengthening mand behaviors in individuals with autism and other developmental disabilities” (2015, p.15).

These procedures include delayed assistance, otherwise known as a time delay (Charlop, Schreibman, & Thibodeau, 1985; Hall & Sundberg, 1987; Halle, Marshall, Spradlin, 1979; Sigafoos, Kerr, Roberts, & Couzens, 1994; Sweeney-Kerwin, Carbone, O’Brien, Zecchin, & Janecky, 2007). Time delay procedures, as outlined in Charlop et, al., (1985) have evidence to support mand skill acquisition and generalization. In the time delay procedure, prompts are provided to the participant after a period of time has passed, often allowing the participant to respond prior to the provision of prompts. The selection

of relevant mand teaching procedures is of significant importance in ensuring efficient mastery of mand skills.

### **Research Questions**

An extensive review of the existing research supporting peer-to-peer mand training resulted in five relevant, published articles, as well as one doctoral dissertation. With the exception of the dissertation, the research thus far has not included specific peer-to-peer mand training that includes focused attempts to increase the generalization of spontaneous mands from peer-to-peer, including peers with, and without, the identification of autism. Kittenbrink (2015) documented that three children with autism could be effectively taught to mand from peers. Although Kittenbrink examined the teaching steps necessary to teach children to mand from peers, these children were in elementary school (6-10 years) and well beyond the age when autism is usually diagnosed. Notably, Kittenbrink further offered anecdotal evidence of increased eye contact from the children with autism, without collecting specific data to support this observation. In order to advance the research concerning early intervention and instructional methodology to support pre-school aged children with autism within the inclusive setting, this study was designed to answer the following questions:

1. When provided with direct instruction for specific mands in a controlled, teacher-led setting, will children with autism transfer and generalize manding skills with same-age or grade-level peers?

2. Will peer-to-peer manding skills observed in teacher-led sessions be observed within the inclusive learning environment (e.g., general classroom) without teacher support?
3. Will manding skills observed within the inclusive settings with teacher support generate increased and spontaneous mands within the inclusive setting without teacher support?
4. As further measure of, and evidence of, social validity will children with autism demonstrate an increased use of appropriate eye contact with peers as the number of spontaneous mands increases?

## CHAPTER 2: METHOD

### Participants and Setting

The study consisted of three different participant groups including: (a) the primary participants (student participants with an autism diagnosis), (b) secondary participants referred to as “peer coaches” (neuro-typically developing peers), and (c) instructor participants.

The primary participants in the study included three pre-school aged children, 4 and 5 years of age, who attended an intensive early intervention program in Maine. To be considered eligible for this study, children must have attended the pre-school program, be between the ages of 3 years and 5 years, 11 months, must have spent a minimum of fifteen minutes per day within the inclusive setting, and be identified with autism. Furthermore, primary participants were nominated and selected for the study after it was determined that they were able to independently and vocally mand (request) for a minimum of ten items from adults/instructors, but had not yet demonstrated generalization of this skill toward peers within the inclusive setting.

April<sup>\*</sup>, was a 4 year old female identified with autism. April had attended the pre-school program for approximately two years and had developed a large verbal vocabulary, including the ability to mand for hundreds of items from adults/instructors. April was observed to use sentences that consisted of 4 to 7 words when speaking with adults. During the previous six months, educational staff reported that April had made significant gains in her use of expressive language, but was exhibiting significant

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\* All names are pseudonyms.



pragmatic delays. April had been fully participating in the inclusive pre-school classroom for six hours a day, for approximately fourteen months. Of particular relevance for the study, April was rarely observed to mand for items or for information from her peers, despite the extensive expressive language that she was observed to use with adults/instructors. April's primary instructor was able to recall one independent mand made toward a peer within a month prior to the start of the study.

Lindsay, was a 4 year old male identified with autism and apraxia. Lindsay had attended the self-contained pre-school program for 2 years and had participated within the inclusive pre-school classroom for 8 months prior to the start of the study. Lindsay demonstrated significant delays with his expressive language, but was able to routinely mand for nearly one hundred items/activities from adults/instructors. Due to his apraxia, some of these mands were vocal approximations with intelligibility at approximately 90% for familiar listeners. Lindsay typically used vocal mands of three words, using the sentence "I want \_\_\_\_ (item)." Lindsay was observed to mand for items from adults/instructors but had not ever been observed to independently mand from a peer since entering the inclusive pre-school.

Krista, was a 5 year old female (who turned 6 years old during the final week of the study) with Autism. Krista had attended the self-contained pre-school program for three years prior to the start of the study. During the study, Krista participated in a self-contained kindergarten transition program for six hours per day and participated in the pre-school inclusive program for one hour per day. Krista evidenced significant expressive language delays. Krista routinely manded for approximately twenty items

from adults/instructors but had not been observed to demand for any items from peers within the self-contained pre-school *and* the inclusive pre-school program.

The secondary participants, referred to as “peer coaches,” included four neuro-typically developing children (two males, two females), ages 4 and 5 years old. The secondary participants were nominated by the pre-school teacher for participation in the study based on the following criteria: demonstration of age-appropriate play skills, demonstrated ability to follow verbal directions, and demonstrated willingness to play with a variety of children within the classroom. Although three students were needed to fulfill the criteria within the initial study proposal, a fourth student was included based upon the teacher’s recommendation and to ensure student availability for the duration of the study. Ultimately, all four students participated in the study, although all four did not participate in intervention sessions with all three children with autism. Each student with autism was partnered with three of the four students across intervention sessions.

Instructor participants included Center staff who worked within the inclusive classroom (Appendix A). Center Staff included paraprofessionals, referred to as instructor participants, who worked to support students with autism within a 1:1 or 1:2 adult to student ratio within the classroom. Within the context of this study, instructor participants provided necessary prompts to students with autism following the prompts that were provided by the peer coaches. In addition, instructor participants collected secondary data that were utilized to report inter-observer agreement.

In addition to the instructor participants, three doctoral level interns, including the author of this study, participated in the delivery of several components of the

intervention. The doctoral level interns participated in and provided the instruction and initial training for the peer coaches. Furthermore, the author of this study participated in each intervention session as the facilitator of the “play session” and as a primary data collector.

All intervention sessions were conducted within the pre-school classroom. The classroom has several “play” areas, including small tables/chairs and carpeted areas where children can play on the floor. Sessions were conducted during regular school hours and amidst other staff and students who were routinely present.

### **Materials**

Students were nominated for participation in the study through teacher recommendation, documented on the Primary and Secondary Participant Nomination Forms (Appendices B & C). Data collection sheets were developed in order to (a) collect baseline data and to document the independence/accuracy of the primary participants in spontaneously manding to peers during intervention sessions (Appendix D), (b) document adherence to the training protocol for peer coaching (Appendix E), as evidenced by mastery of the prompting protocol, and (c) to document the independence/accuracy of the primary participants in spontaneously manding to peers during free play sessions within the natural environment (Appendix F). A direct instruction script (Appendix G) was utilized by the doctoral level interns when providing instruction to the peer coaches.

The primary participants accessed toys and activities found within the inclusive pre-school classroom. The toys and activities selected for intervention sessions included

puzzles, peg/pegboard sets, building block sets, Lego sets, dress-up clothes and Mr. Potato Head play sets.

### **Assessments**

In order to determine preference for and willingness to play with particular toys and activities, formal preference assessments were conducted with the primary participants, using a multiple stimulus presentation procedure. The multiple stimulus without replacement (MSWO) procedure was utilized by lining toys/activities up in a randomly sequenced array. The MSWO procedure has been shown to have high predictive validity in identifying preferred items, and takes brief period of time to administer (Hagopian, Rush, Lewin, & Long, 2001). The participant was told to “play.” After the student selected a toy/activity to play with, the toy/activity was removed from the assessment area, without a replacement item being introduced. The student selected items until all items were selected or 30 consecutive seconds ended without a selection (DeLeon & Iwata, 1996). The MSWO procedure was conducted over three sessions across two days for each of the three primary participants.

During individual sessions, the toys/activities were presented to the primary participants with the instruction to “play.” Activities were selected for inclusion in the study if the primary participant was willing to play with the toys/activities for one to two minutes at a time, or until completion of the activity was observed (for example, completing an inset puzzle).

As Table 1 indicates, the preferences for toys and/or the willingness to play with particular toys varied across participants. Krista chose to complete puzzles, build with

Legos and blocks, and to insert pegs into pegboards. Krista did not display interest in playing with dress-up clothes or with the Mr. Potato Head. Lindsay was willing to play with Mr. Potato Head, Legos, blocks, puzzles and peg/pegboard sets. April demonstrated an interest in playing with all of the available toys/play activities, but demonstrated more rigidity in her preferences, demanding to use “all” of the red pegs, all of the green Legos, both of the princess wands, etc.

Table 1

*MSWO - Participant Preference Assessment*

Participant	Blocks	Legos	Mr. Potato Head	Puzzles	Peg Board	Dress-Up Clothes
Session 1						
April	3	5	6	2	4	1
Lindsay	2	4	5	1	3	no
Krista	1	4	No	2	3	no
Session 2						
April	2	5	6	3	4	1
Lindsay	3	2	4	1	5	no
Krista	3	1	No	2	4	no
Session 3						
April	4	6	1	3	5	2
Lindsay	5	3	4	2	1	no
Krista	3	4	No	1	2	no

The MSWO procedure provided information about primary participants’ play preferences, although the order of this preference varied greatly from day to day. When a student indicated consistently that he or she was not interested in a particular toy or activity, that toy/activity was not selected for intervention sessions. As the results in

Table 1 indicate, dress-up clothes were not used as an activity with Lindsay. As these results further indicate, dress-up clothes and Mr. Potato Head were not used with Krista. All activities and toys were used with April, based on her observed choice to play with the varied toys/activities.

### **Data Collection**

The dependent measure used to evaluate the intervention protocol included observations of (a) the primary participants' mand behaviors from peer coaches within intervention sessions, and within the natural environment (pre-school classroom).

In order to measure the primary participants' manding behaviors during each intervention session, data for each intervention and classroom session were collected, documenting (a) length of each intervention session, (b) primary participant, (c) peer coach, (d) toy/activity, (e) number of independent/accurate mands, (f) number of prompted mands. Calculations were completed to include (g) the total number of mands and (h) the total percentage of independent/accurate mands per session. Secondary observers recorded data during one third of all intervention sessions in order to provide inter observer agreement (IOA) Data.

### **Procedure**

**Procedural Safeguards and Informed Consent.** All study methods and procedures were approved through the University of Southern Maine (USM) Institutional Review Board (IRB) prior to implementation. Parental consent and student assent were obtained prior to the start of data collection.

In order to examine the effects of the intervention protocol on the primary participants' ability to mand with peers within the natural environment (pre-school classroom), data were collected by the instructional staff during three separate thirty-minute intervals of free play. These generalization sessions were conducted with each participant during study phases, including baseline, and intervention.

In addition to the baseline sessions, data were collected during 3 observations of each student during the course of the study, conducted within the natural environment by the classroom instructor, for a period of 30 minutes per observation. These observations provided data on spontaneous mands to peers that occurred within the natural environment and without teacher direction or prompting. Inter-observer agreement data were collected by the researcher during the last scheduled observation of each student during the study.

**Interventionist Training.** Prior to the onset of the investigation, staff received trained on the following: (a) peer coaching training module, (b) mand data collection (intervention sessions), (c) mand data collection (natural environment/pre-school), and the (d) prompting protocol for intervention sessions. The peer coaching training module included a direct instruction script and role play opportunities. This was practiced extensively with the three interventionists that provided the training to the peer coaches. The instructional staff within the pre-school classroom was previously trained in (and not for this study) the collection of frequency data and specifically trained to collect frequency data on the occurrence of spontaneous mands and prompted mands.

**Baseline.** During the baseline condition each participant was observed during free play opportunities within the classroom. Prompting was not provided by the instructional staff. Data forms were completed through the use of direct observation and the collection of frequency count data in order to identify the number of spontaneous mands made by the primary participants that were directed toward peer(s) during play sessions within the classroom. In addition, a frequency count of spontaneous eye contact exhibited by the primary participants toward peers during the mand was recorded. These free play opportunities were 30 minutes in length and occurred over three consecutive school days. IOA data were collected during the baseline condition, by the researcher during these free play sessions.

**Intervention.** Each secondary participant (peer coach) was partnered with a primary participant with autism. One classroom instructor within the pre-school was assigned to prompt and reinforce the primary participant and to collect IOA data for one third of the intervention sessions. The researcher prompted and reinforced the peer coach, collected data on the primary participant's manding behavior, and provided praise and tokens to both participants.

The intervention sessions took place in different areas within the classroom, including the sensory tables, the classroom activity table and the play rug. At the start of each session, the secondary participant and the primary participant with Autism were brought to the designated area in the classroom. The peer coach was given a bin with the play items and both children were directed to "play." During each trial, the coach held out the toy/play item to the primary participant and waited for a vocal mand or a reach.



When the vocal mand was made by the primary participant, the coach gave the child the item and said “Here you go,” “Sure,” “Yep” or another socially relevant comment. If the primary participant did not mand for the item, the peer coach waited for the primary participant to show interest in the toy. As soon as the primary participant showed interest in one of the toys (e.g., pointing, reaching for, babbling, etc.) he or she was prompted by the coach to mand for the item. This prompt was given after the coach tapped the table three times (i.e., a three second delay) and then said the name of the item. The primary participant then manded for the item or was prompted to mand for the item by the classroom instructor. The coach received positive praise and feedback as well as a token for participation in the manding exchanges. If the scripted procedure was not followed by the coach, a quiet verbal prompt was provided by the researcher so that the procedure was implemented with fidelity.

The intervention sessions lasted for 5 to 15 minutes and included one to two toys for mand practice. All of the participants were willing to participate fully in 100% of all sessions. Sessions were not terminated or altered due to refusal. Primary participants were paired with the same coach for intervention sessions with each coach until the primary participant was able to mand independently from the coach independently and accurately at least 90% of all opportunities, across three different stimuli. Opportunities were defined as the primary participant’s non-verbal display of interest (point, gesture, reach) for the toy. The mand had to be delivered prior to the end of the 3 second delay (and prompt) in order to be considered independent.

The vocal mand had to be an appropriate vocal mand in order to be considered accurate. For example, “lego” was accepted for “lego.” Additionally, appropriate adjectives and descriptive language were considered as accurate when collecting data. For example, if a primary participant said “I want a blue one” when playing legos, this was considered an accurate mand and credit for accuracy was given. Independent mands were defined to include accuracy and occurred without prompting from the coach or adult.

During all intervention sessions, data were collected on the frequency of the primary participant’s mands for the items, and whether the mands were completed independently or after being prompted. The total number of the mands per session was documented. In addition, the length of the intervention sessions was recorded. When a primary participant demonstrated 90-100% independence and accuracy across opportunities, for three consecutive intervention sessions with one coach, using at least two different toys, mastery was obtained. Upon reaching mastery criteria with a coach, the primary participant was paired with a new coach, to begin a new set of intervention sessions.

These intervention sessions were implemented until each primary participant demonstrated mastery criteria with three different coaches. Following attainment of mastery, the participant entered Phase 3, the Generalization Phase.

**Eye Contact** The original study proposal included plans to collect data regarding occurrences of eye contact that occurred with spontaneous mands. Data collection for eye contact proved to be unreliable for the following reasons; (a) coaches did not

consistently look at the primary participants when they were visually attending to the toys and (b) many of the toys required visual attention (building blocks, legos, peg boards, puzzles) inhibiting a natural occurrence of eye contact. Given these concerns, attempts to collect these data points were discontinued.

**Peer generalization.** During this phase, primary participants were randomly assigned and partnered with previously matched “coaches” for additional intervention sessions. Data were collected for each intervention session in the same manner as other phases (see Appendix L: Data Collection Peer Generalization Training). The primary participants reached mastery in the generalization phase once they demonstrated independent and accurate mands from all three coaches at a rate of 90% of given opportunities within the intervention sessions. In addition, the mastery criteria required that students must be able to mand for at least three different toys across the varied instructional sessions, although not necessarily within one intervention session. These mastery criteria were developed to ensure generalization across varied peers and stimuli.

To record any observed generalization effects outside of the intervention sessions, additional data were collected by the pre-school teaching staff during three separate observations of free play within the classroom using Appendix L: Data Collection Classroom Generalization Probes. The teachers recorded spontaneous, independent mands from the primary participants to other peers (coaches or other peers) within the classroom setting. The data collected indicated the time of day that the mand occurred, the peer that the mand was directed to, and the item that was requested.

## Treatment Integrity

In order to determine whether each procedural step of the study was conducted accurately, 30% of all sessions were monitored for treatment integrity. The researcher used a checklist of required steps (Appendix D) for the coaches and viewed videos of the sessions to record whether each was done correctly. Treatment integrity was calculated by dividing the number of correct steps by the total number of steps possible to yield a percentage. The treatment integrity data were utilized to determine if the coaches needed remediation or additional coaching in order to ensure that the delivery of the prompting protocol was accurate. If a coach's data for a session indicated less than 90% accuracy in the implementation of the prompt procedure, the researcher would have re-trained the coach until at least 90% accuracy was shown across three practice sessions. As Table 2 indicates, additional training for the coaches was not necessary.

Table 2

*Treatment integrity data for each coach*

Coach	Number of Mand Opportunities	Treatment Integrity Percentage
HS	45	42/45 = 93.3%
CL	59	58/59 = 98.3%
ML	52	48/52 = 92.3%
JC	57	52/57 = 91.2%

Treatment integrity ranged from 91.2% to 98.3%, exceeding the minimum level of 90%.

Coaches were very responsive to corrective feedback within each session.

## Inter-Observer Agreement

Observation and data collection accuracy was calculated by having secondary observers collect additional data during 100% of the baseline sessions (Table 3), 30% of the total intervention sessions (Table 4), and 30% of the free play sessions within the natural environment (Table 5). The student data were evaluated and compared to examine how many intervals were recorded with consistency across the two observers. The percentage of inter-observer agreement (IOA) was determined by dividing the number of agreements by the number of agreements plus disagreements and multiplying the result by 100. IOA was expected to be at least 90% for all co-observed intervention sessions.

Table 3

### *Baseline inter-observer data*

Primary Participant	Session 1	Session 2	Session 3
April	100%	100%	100%
Lindsay	100%	100%	100%
Krista	100%	100%	100%

As Table 3 depicts, IOA data indicated 100% agreement across the baseline sessions, exceeding the expectation of 90% across intervention sessions.

Table 4

### *Intervention phase inter-observer data*

Primary Participant	Sessions	Mand Opportunities	Percentage
April	6	59 mands	100%
Lindsay	7	83 mands	100%
Krista	5	59 mands	98%

Table 4 provides IOA data collected during the intervention sessions and indicates 98% to 100% agreement

Table 5

*Natural setting inter-observer data*

Primary Participant	Baseline	Intervention	Generalization
April	100%	100%	100%
Lindsay	100%	100%	100%
Krista	100%	100%	100%

Table 5 provides IOA data collected during the observations that were conducted within the classroom environment, during free play sessions. IOA was observed at 100%.

### **Experimental Design**

This study used a multiple baseline across subjects design. The experiment included baseline, intervention, and maintenance phases, with additional observations conducted within the natural environment to assess for generalization of spontaneous mands towards peers.

The participants' data were evaluated in two ways. Visual inspection of the data was conducted to consider the level, immediacy, and trend of changes across phases. In addition, data from the classroom observations were inspected to ensure that written records of spontaneous mands within the classroom mirrored any reports of those spontaneous mands.

### CHAPTER 3: RESULTS

The overall results for all three primary participants, illustrated with Figure 1, indicate that the peer coaching intervention protocol was effective in promoting increased independent and accurate mands to peers within the intervention sessions. All three students exhibited significant increases in independent mands across different peers and for varied toy items during intervention sessions. In addition, two of the three primary participants demonstrated increased mands to peers within the natural environment, in their inclusive classroom.

As Figure 1 indicates, April did not demonstrate any independent manding towards her peers during three baseline sessions, lasting thirty minutes per session. During the training sessions with the first peer coach, April demonstrated a quick increase in the use of independent manding towards peers. In the first session, April was prompted to mand from her peers during 55% of given opportunities and demonstrated 45% independence. During the second training session, April demonstrated 85% independence in the use of a vocal mand toward her peer. During the final three sessions with this peer coach, April manded with 95%, 95% and 100% independence.

Following these initial teaching sessions with the first peer coach, April was then paired with a second peer coach. Figure 1 indicates that April's level of independence dropped to 70%, necessitating that the peer provide a prompt 30% of opportunities in the first session. However, during the second, third and fourth teaching sessions, April was observed to mand for items with 100% independence across the teaching sessions.





April was then paired with a third peer coach. During this pairing, the data indicated that April maintained her level of independence when paired with a third peer. April maintained 100% independence when manding from a third peer, across three teaching sessions. Figure 1 indicates that when April was placed in the generalization phase of the treatment, randomly being partnered with the three previous peers, she continued to maintain 100% independence when manding within the teaching sessions. It is worth noting that the generalization phases included opportunities to mand from all three peer coaches with four different toys/activities- puzzles, pegs/pegboards, legos and blocks.

Figure 1 depicts the increased independent use of mands with peers by Lindsay, a five year old student with autism. Lindsay did not demonstrate any independent manding towards his peers during three baseline sessions, lasting 30 minutes per session. During the training sessions with the first peer coach, Lindsay demonstrated an increase in the use of independent manding toward peers. In the first session, Lindsay was prompted to mand from his peer during 37% of opportunities, manding independently from his peer only 63% of opportunities. During the second teaching session, Lindsay demonstrated an increase in his independent use of mands, demonstrating 88% percent independence during the teaching session. During the third teaching session, Lindsay demonstrated 90% independence when manding for items from his peer. Lindsay then demonstrated 100% independence across two consecutive teaching sessions with the first peer coach.

Figure 1 depicts a sharp decline in Lindsay's independent vocal manding when he was paired with the second peer coach. During the initial session with the second peer coach, Lindsay required prompting during 60% of all opportunities, demonstrating the

ability to mand from his peer 40% of opportunities with independence. Lindsay demonstrated increased independence during the second teaching session with this same peer coach, increasing his independence level to 88%. During the third session, his independence rose slightly to 90% and rose again to 100% independence during the fourth and fifth sessions.

When matched with the third peer coach, Lindsay demonstrated 70% independence during the first teaching session. His independent use of mands with peer coach number three quickly rose to 100% during the second teaching session and remained at 100% independence during sessions three and four.

Figure 1 indicates that when Lindsay entered the generalization phase, being randomly partnered with the previous peer coaches, Lindsay was able to maintain 100% independence for all manding opportunities, across all three peer coaches and for three different activities: blocks, Legos and pegs/peg boards.

Figure 1 includes Krista's independent manding data collected during baseline, teaching sessions with specific peer coaches, and in the generalization phase. Krista did not demonstrate any independent manding toward her peers during three baseline sessions, lasting thirty minutes per session. During the training sessions with the first peer coach, Krista demonstrated an increase in the demonstration of independent manding towards peers. In the first session, Krista was prompted to mand from her peers during 30% of opportunities, manding independently from her peer for 70% of opportunities. During the second teaching session, Krista demonstrated an increase in her independent use of mands, demonstrating 90% percent independence during the teaching

session. During the third and fourth teaching sessions, Krista demonstrated 100% independence when manding for items from her peer.

Figure 1 depicts a slight decline in Krista's independent vocal manding when she was paired with the second peer coach. During the initial session with the second peer coach, Krista required prompting for 10% of all opportunities, and manding from her peer 90% of opportunities with independence. Krista quickly demonstrated increased independence during the second teaching session with this same peer coach, increasing her independence level to 95%. During the third session, her independence rose again to 100%. Krista was able to maintain "mastery criteria" for all sessions with the second peer coach, maintaining 90% to 100% independence when manding within these sessions.

When matched with the third peer coach, Figure 1 depicts an initial decline in Krista's independence level when manding. Krista demonstrated 65% independence during the first teaching session when partnered with the third peer coach. Her independent use of mands with peer coach three rose steadily with each teaching session. In session number two, Krista achieved 75% independence when manding and during the third session, Krista achieved 85% independence when manding. In the fourth session, Krista achieved 90% independence when manding. During the fifth and sixth sessions, Krista was able to demonstrate 100% independence when manding from peer coach number three.

Figure 1 indicates that when Krista entered the generalization phase, being randomly partnered with the previous peer coaches, Krista was able to maintain high

levels of independence for all manding opportunities, across all three peer coaches and for three different activities: blocks, Legos and pegs/peg boards. During the first and third sessions, she maintained 100% independence. During the second session, she exhibited 90% independence, requiring one prompt from the peer. However, it was noted that the peer coach provided a prompt after a two second delay, versus the three second delay previously established.

In Figure 1, the data indicate that the peer coaching intervention protocol was useful in promoting increased independent and accurate mands to peers within the intervention sessions. All three students exhibited significant increases in their ability to independently mand with varied peers and for varied toy items during intervention sessions. In addition, two of the three primary participants demonstrated increased ability to mand to peers within the natural environment, in their inclusive pre-school classroom.

## CHAPTER 4: DISCUSSION

Although the severity of social communication and social interaction deficits can range significantly in children identified with autism, for about 50% of children identified with autism these deficits include a failure to develop functional vocal communication (Bailey, Phillips, & Rutter, 1996). Children who fail to develop functional communication repertoires are much more likely to engage in maladaptive behaviors such as aggression, self-injury, tantrum behavior, etc. Based on extensive evidence of the benefits derived from the development of language and communication skills of children with autism, educators and clinicians continue to develop specific teaching strategies that will be effective for the varied learning needs of students with autism.

With such supports, many students with autism have proven successful in acquiring a basic mand repertoire, typically used with or directed to adults. Emerging research continues to demonstrate the difficulty that some children have in generalizing their ability to mand with peers, including a recent study conducted by Sweeny-Kerwin, Carbone, O'Brien, Zecchin, and Janecky (2007) where authors noted "response generalization was not observed for any of the participants" (p. 94). For children with autism, peer relations will often fail to develop unless instruction includes sessions learning and practicing interactions with target peers. The findings of the current research are consistent with those of Sweeny-Kerwin, et al., in that they showed how students with autism can learn and use manding skills with matched and generalized target individuals. In other words, prior research has shown that students with autism

who were taught to mand with adults could generalize this skill but did not also mand with peers.

The current study suggests that instead of relying on generalization from adults to peers through mand training in a “train and hope” model (Stokes and Baer, 1977) the participants received direct instruction in mand training to peers in structured teaching sessions that utilized a peer coaching model with a minimum of three peers (i.e. sufficient exemplars) to promote generalization. For example, all of the students in the current study learned and generalized peer manding skills despite not showing this behavior after manding with adults. Although all three participants had been observed to mand from adults, none of the participants were observed to mand from their peers with fluency or comparable frequency. This study began by affirming a consistent research finding that all three of the children in the study exhibited previously established mand repertoires with adults, but not with peers.

These data from the study suggest that the intervention sessions utilizing peer coaches led to a direct and significant increase in independent manding behavior for all three of the participants within the training condition. However, generalization was observed for two of the three students within the free play setting in phase three. These data demonstrate that a training package consisting of direct instruction and sufficient exemplars resulted in both an increase in acquisition of peer manding and generalized manding within the natural environment with two out of three subjects. Although the generalized and increased manding behaviors were not observed with Krista within the natural environment and during free play sessions, her previous developmental history

and struggles to acquire functional communication suggest that continued intervention might be warranted, and that she could need additional instruction and opportunities for practice. In addition, restricted access to items within the natural environment did not appear to act as a motivating operation for Krista. One hypothesis is that manding from peers within the teaching sessions was motivated by negative reinforcement, withdrawal from peer attention and the instructional task following mand behavior. This is in direct opposition to motivation for positive reinforcement, where the mand is reinforced by accessing the item. Future analysis with Krista could involve comparing two conditions; (a) manding for break from instruction/peers (negative reinforcement hypothesis) compared with (b) manding from peers for items (positive reinforcement hypothesis).

All three of the primary participants within the study had been students within the inclusive classroom for at least eight months, had all received extensive speech and language services, and all had previously participated in activities designed to increase their manding repertoires with adults. Specific teaching strategies had not previously been implemented to increase their independent manding skills with peers. Given this context, it appears that the success of the participants' increased manding with peers is attributed to this intervention package. This peer manding protocol and intervention proved to be a successful intervention tool for all 3 of the participants within structured teaching sessions and for 2 of the 3 participants within the natural environment.

### **Social Validity**

Prior to the implementation of this study, the primary participants, all pre-school aged children with autism, had been unsuccessful in the use of independent mands with

their peers. These children either were unable to access items that they wanted, ripped toys out of the hands of their peers, pointed to items, or displayed other maladaptive behaviors such as crying, in an attempt to get a preferred toy or activity. During the baseline sessions, Lindsay was aggressive towards an instructor and a peer in his attempts to get preferred items. April repeatedly asked for assistance from adults within the classroom in order to access items that she wanted to play with. Krista played alone, watching her peers.

Following intervention, the data indicated an increase in independent manding for both April and Lindsay. During the free play observations, Lindsay did not display aggressive behavior toward the instructor or to the peers in his play area. April demonstrated an increase in her use of independent mands, and anecdotally, increased her spontaneous use of comments towards peers.

Through an intervention package that consisted of peer coaching and targeted mand training sessions, all three children demonstrated increased ability to independently mand from their peers within the intervention sessions. In addition, two of the three children within the study demonstrated generalized use of their ability to mand with peers, demonstrating increased use of independent mands during free play conditions. These findings should be considered significant given that the intervention caused positive increases in manding towards peers with relatively low levels of instruction. April participated in 15 instructional sessions that lasted between five and fifteen minutes. Lindsay participated in 17 instructional sessions that also lasted between five



and fifteen minutes. Krista participated in 16 instructional sessions. These sessions lasted between four and twelve minutes.

The findings of this study have significant social validity. Both the primary and secondary participants eagerly participated in the intervention sessions, often choosing to continue the last activity after the tokens were distributed, signaling the end of the session. In addition to the demonstrated increases in vocal communication with their peers, Lindsay was observed imitating structures being built by his peer and repeated several comments made by his peer while playing. These bids at spontaneous imitation had not been observed within the classroom prior to this study.

The data clearly indicate that the primary participants benefitted directly from this study and it might be that the secondary participants, the peer coaches, also benefited from this opportunity. While participating in this study, peer coaches received high rates of praise for appropriate behavior, for their play skills, and prompting techniques. Participants raced to the door for the opportunity to participate in the study and were genuinely pleased with the activities. In addition, the peer coaches demonstrated increased confidence in their interactions with the children with autism. During the early phases of the study, if a mand was spoken softly or with poor intelligibility, the peer coach would look to an instructor for clarity or assistance. During the later sessions of the study, each peer coach was observed, at least once, to say “What did you say?”, “Say it again” or “Try again, I can’t hear you.” Their persistence and patience with their peers increased as their confidence in communicating with their peers with autism increased.

Unfortunately, this study failed to appropriately and accurately assess the use of eye contact, specifically the evaluation of increased eye contact during independent mand exchanges with peers. While poor eye contact is considered to be a hallmark characteristic of children with autism, more research on the true appropriateness and appearance of “typical” eye contact for the pre-school population might prove helpful. Anecdotally, the peer coaches made little attempt to make eye contact with their peers when talking to them if manipulatives and toys were being utilized. Even when responding to requests from their peers, the peer coaches seldom looked up from the bin of Legos or peg boards, and did not provide visual attention to their task and auditory attention to their peers.

As further support for the relevance of this study, the instructional staff members within the classroom have all expressed significant support for the peer coaching model and hope that this will continue and expand to other children. As an anecdotal comment of support for the importance of this study, one instructor noted “I don’t want to seem mean, but I thought this idea was crazy and that it would never work. I am shocked at how well he is doing and the difference I have seen in his language!” A second instructor, one who has been employed at the Center for eight years stated “I cannot believe we haven’t thought to do this technique sooner. April is talking more to her peers in the last three weeks than she has in two years. This is amazing! We have to do more of this with all of our kids.”

## **Limitations**

This study included three children with autism, all under six years of age. Due to the limited nature of the population, it is difficult to predict the larger, more generalizable, effects this study could have on a broader population, including younger or older than the children in the study. In addition, the peer coaches comprised a small group of children who were easily instructed, cooperative and eager to participate. It is difficult to predict if another sample of peer coaches would prove as reliable and eager in their work with their peers. In addition, the study was conducted in a relatively short time frame and it is difficult to predict if the independent mands will increase within the classroom, decrease or plateau and maintain at the current rate. Finally, this study was conducted in a program that utilizes Applied Behavior Analysis for students with very specific needs. This study was not conducted within the general education setting, thus results might not generalize to such settings.

## **Future Research**

Additional research could extend the length of the study to include longer periods for generalization into the natural environment, across a larger peer group and in settings outside of the classroom (the playground, gym, library, etc.). Such replication could look more closely at the rates of mand increase to identify possible trends and goals for expected rates of improvement. Additionally, further research could be done to examine the motivating operations with specific children and the negative reinforcement versus positive reinforcement paradigm that instructional sessions may pose (Steege, et.al., 1990). In addition, this same study would be well designed for replication with siblings

within the home environment. Finally, the candidates for this study were selected if they demonstrated the ability to vocally mand. Many children with autism utilize Picture Exchange Communication or augmentative devices. Future research may serve this population well to include children utilizing non-vocal communication abilities.

## **CHAPTER 5: CONCLUSION**

The results of this study suggest that the intervention sessions utilizing peer coaches led to a direct and significant increase in independent manding behavior for all three of the participants within the intervention sessions. The increased manding behaviors generalized within the natural environment and during free play sessions for two of the three students. Although the generalized behavior was not observed with Krista within the natural environment, her previous developmental history and struggles to acquire functional communication suggest that continued intervention was warranted, and that she might need additional instruction and opportunities for practice. In addition, Krista may have utilized independent manding skills to peers within the intensive teaching sessions in order to terminate the activity versus using the independent mand to acquire the preferred item. These results are promising with regard to treatment options for improving language skills in children with autism.

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**Appendix A: Primary Participant Nomination Form**

Student:

Age:

Does this student have a Diagnosis of Autism/Autism Spectrum Disorder? \_\_\_\_\_

Is this student manding for at least ten different items? \_\_\_\_\_

List ten items the student mands for:

Does this student participate in the inclusive pre-school classroom for at least 15 minutes per day? \_\_\_\_\_

Teacher \_\_\_\_\_ Date \_\_\_\_\_

Please Return to Michelle Hathaway

Thank You!

Verification that the Child has an Autism Diagnosis: \_\_\_\_\_

Data were reviewed and indicates the child is able to mand for at least ten different items? \_\_\_\_\_

**Appendix B: Secondary Participant Nomination Form**

Student Name: \_\_\_\_\_

Age: \_\_\_\_\_

Does this student demonstrate age-appropriate play skills? \_\_\_\_\_

Does this student follow teacher directions/instructions? \_\_\_\_\_

Is this student willing to play with a variety of students? \_\_\_\_\_

What types of activities/toys does this child routinely play with in the classroom setting?  
\_\_\_\_\_

Teacher Name: \_\_\_\_\_ Date: \_\_\_\_\_

Please complete and return to Michelle Hathaway.

Thank You!

### Appendix C: Data Collection Sheet, Spontaneous Manding

Student: \_\_\_\_\_ Staff: \_\_\_\_\_  
 Start Time: \_\_\_\_\_ End Time: \_\_\_\_\_

#### Spontaneous Mands to Peer(s)

Mand Count	For Item/Activity (What)	Towards Peer (First Name, Last Initial)	Eye Count While Manding (Y)-Yes, (N)-No
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			
25			

IOA Data Collected: Yes    No                      Attach IOA Sheet If YES

If IOA Data Collected, Percentage of Agreement Reached: \_\_\_\_\_

## Appendix D: Secondary Participant Training Session Data Form

Date: \_\_\_\_\_ Data Collector: \_\_\_\_\_

Student:	Student:	Student:
<b>Step One:</b> (Ball) Hold item, Give when Peer says Item name (+= ind., - =pr.)	<b>Step One:</b> (Ball) Hold item, Give when Peer says Item name (+= ind., - =pr.)	<b>Step One:</b> (Ball) Hold item, Give when Peer says Item name (+= ind., - =pr.)
// / / / / / / / / /	// / / / / / / / / /	// / / / / / / / / /
Percent: _____	Percent: _____	Percent: _____
Mastery Criteria: 90%	Mastery Criteria: 90%	Mastery Criteria: 90%
<b>Step Two:</b> (Ball) Hold Item. Tap 4 times. Say Item Name. Give Item after Peer says Item	<b>Step Two:</b> (Ball) Hold Item. Tap 4 times. Say Item Name. Give Item after Peer says Item	<b>Step Two:</b> (Ball) Hold Item. Tap 4 times. Say Item Name. Give Item after Peer says Item
// / / / / / / / / /	// / / / / / / / / /	// / / / / / / / / /
Percent: _____	Percent: _____	Percent: _____
Mastery Criteria: 90%	Mastery Criteria: 90%	Mastery Criteria: 90%
<b>Step Three:</b> (Ball) Hold Item. Tap 4 times. Say Item Name. Wait for Teacher Prompt Give Item after Peer says Item	<b>Step Three:</b> (Ball) Hold Item. Tap 4 times. Say Item Name. Wait for Teacher Prompt Give Item after Peer says Item	<b>Step Three:</b> (Ball) Hold Item. Tap 4 times. Say Item Name. Wait for Teacher Prompt Give Item after Peer says Item
// / / / / / / / / /	// / / / / / / / / /	// / / / / / / / / /
Percent: _____	Percent: _____	Percent: _____
Mastery Criteria: 90%	Mastery Criteria: 90%	Mastery Criteria: 90%
<b>Step Three:</b> (Random Items) Hold Item. Tap 4 times. Say Item Name. Wait for Teacher Prompt Give Item after Peer says Item	<b>Step Three:</b> (Random Items) Hold Item. Tap 4 times. Say Item Name. Wait for Teacher Prompt Give Item after Peer says Item	<b>Step Three:</b> (Random Items) Hold Item. Tap 4 times. Say Item Name. Wait for Teacher Prompt Give Item after Peer says Item
// / / / / / / / / /	// / / / / / / / / /	// / / / / / / / / /
Percent: _____	Percent: _____	Percent: _____
Mastery Criteria: 90%	Mastery Criteria: 90%	Mastery Criteria: 90%

## Appendix E: Data Collection Classroom Generalization Probes

Primary Participant: \_\_\_\_\_

In the event that this student independently mands from a peer within the classroom setting or other natural environment within the school setting (playground, library, etc.), please record the following information.

[illegible]



## Appendix F: Secondary Participant Training Procedure and Script

### Set-Up/Prep:

Prior to the Training Session with Secondary Participants, 10 preferred toys and items shall be gathered into a basket and two small containers of “easily consumed” snack foods (popcorn, cheerios, etc.). It is important that any allergies are identified and that the snack foods can be consumed by all participants. In addition, three small token boards will be created for the participants to reward effort. A small prize box must be prepared to include small trinkets and items such as stickers, tattoos, lollipops, etc. The training session will take place at the group instruction table within the pre-school classroom.

The following scripts and role-playing opportunities will be used.

**Will Roy, Research Assistant** : **“Thank you for coming to our Activity Time! I am going to show you how to be a good friend and to help teach some of our friends how to use their words at school!”** Take out one of the token board and put on the table. **“I want to show you these special token boards. Every time we work on our talking activity, you will use your token board. You will get tokens to fill up your token board when you are demonstrating great effort...following directions, using your words and working hard on our activities. When your token board is full at the end of our activity, you will get to trade the tokens for a prize from my prize box!”** Bring out the other two boards and place one in front of each child. **“Look, I have one for each of you. I am going to write your name on the board so you know it is your special token board.”** Write each child’s name on a token board. **“Now I am going to show you the prize box!”** Open the prize box and allow each child to look in. Show several items that are in the box. **“When you get all of your tokens for following directions, using your words and working hard, you will get to pick one of these prizes.”** Put the lid on the prize box. **“Now, let’s talk about the activities we will be doing! I am going to ask Russ to help me right now. I want you to pretend that Russ is a boy in your classroom and I am another boy in your classroom. Russ and I are going to do an activity together. I am going to be a coach like you, and Russ is going to be learning how to use his words.”** Take out a ball from the toy basket. **“Russ really likes balls. I have the ball and I am going to hold it in my hand. Russ wants the ball so he is going to say “Ball”. When Russ says “Ball”, I am going to give him the ball. Watch!”** Hold out the ball.

**Russell Brown, Research Assistant**: **“Ball”**

Will: Give him the ball. **“See, Russ wants the ball. I held up the ball. He said “ball” so I gave the ball. Let’s do it again! I am going to hold up the ball. Russ wants the ball so he is going to say “ball”. When he says “ball” I am going to give him the ball.”** Hold up ball.

Russ: **“Ball”**

Will: Gives Russ the ball. **“Wow! That was great. I had the ball. Russ wanted the ball. He said “ball” so I gave the ball to Russ.” “You are doing such a good job listening and watching. I am going to give you a token! Here you go!”** Deliver one

token to each board. **“You are going to fill up your token boards!” “Now, each of you is going to practice being the coach with Russ. Are you ready? Ok. I want \_\_\_\_\_(participant) to come sit with me. You are going to hold up the ball.”** Give the participant the ball. “Okay, hold up the ball.” Child hold the ball or is prompted to hold the ball. When the ball is held,

Russ: “Ball”

Will: **“Russ said ball. Give him the ball”. Praise the child. “Let’s do it one more time, all by yourself!”** Repeat and provide praise or corrective feedback. Upon completion of this scenario, give the child a token.

Repeat with the two other children. Provide praise or corrective feedback. Run through two opportunities per child. Give each child a token upon completion of their opportunity.

Will: **“You were so good at being a coach! Let’s make it a little trickier! Russ still wants the ball, but he is having a hard time using his words and he forgot how to say ball. We all forget our words sometimes right? So Russ is going to want the ball, but he can’t remember the word. You are going to teach him how to say ball! Watch me pretend to be Russ’s coach.”** Hold up the ball. **“I am going to hold up the ball. Russ is going to look at the ball but he can’t remember the word for ball. I am going to hold the ball and tap my finger four times. Watch.”** Hold the ball, tap your finger on the table four times. Do not count out loud. **“I tapped my finger four times and Russ can’t remember so I will help him. I’m going to say “ball.” Watch again.”** Hold up ball. Tap finger four times. Say “ball”.

Russ: “Ball”

Will: Give Russ ball. **“Look! When I said “ball”, I helped Russ use his words! Let’s show them again Russ”** Repeat. Hold Ball. Tap four times. Say **“Ball”**

Russ: “Ball”

Will: Give Russ ball. **“See how we can help our friends to use their words! Now it’s your turn to try! First, everyone get one hand ready with a finger to tap. Show me your pointer finger. Excellent! Let’s tap four times. You can count in your mind with magical counting but don’t say it out loud! Ready, let’s tap!”** Demonstrate. Praise tapping. Repeat until each child taps four times and stops at four taps. Praise the group and reward each child with a token.

**“Ok! Each of you gets a try!”** Repeat this with each child. DATA Collection (Appendix \_\_) will be completed by an additional research assistant to ensure that each child demonstrates mastery criteria for this step. Provide prompting and corrective feedback as needed. If the child is unable to complete mastery criteria within three trials, provide a token for effort and allow them to watch the other two peers. Repeat.

Will: **“You are great coaches! We have one more step to our activity before we try some new toys! I have the ball. I hold the ball up. I am going to tap my finger four times (demonstrate) and say “ball”. Uh-oh! Russ maybe didn’t hear me! Guess what, his teacher is going to help him listen to your words. Watch us!”** Hold up ball. Tap four times. Say **“Ball”**.

A teacher behind Russ says “ball”

Russ: **“Ball”**

**Will: Give him the ball. “Yes! His teacher helped him listen to my words. Sometimes friends don’t hear us or they need a little extra help. She needed to help Russ say ball. When he said ball, I gave him the ball. Thank you for watching this. I am going to give you a token for being good listeners!”** Distribute tokens. **“Let’s watch that again!”**

Repeat.

**“Okay, you each get a turn to try this activity! Ready?”** (Data will be collected for each child at this step, to document mastery.) . Provide prompting and corrective feedback as needed. If the child is unable to complete mastery criteria within three trials, provide a token for effort and allow them to watch the other two peers. Repeat for each child. When done, **“You each earned a token! Great work!”** Distribute tokens.

**“Russ really likes that ball, but he wants to play some other toys. Let’s practice with some other toys.”** Run practice trials with dinosaur, doll, block and popcorn. Data is collected for each child to ensure mastery criteria. At this phase, rotate so that each child takes the first practice demonstration to ensure independence. Distribute tokens so that each child fills his token board. Discontinue after these final practice trials and when token boards are full.

**“You did an amazing job with our practice activity! I hope you had fun! You get to pick your prize! Thank you for being great coaches today and for teaching Russ to use his words!”**

Allow each child to pick a prize and return them to their scheduled activity.

Pending the data, additional teaching sessions may need to be scheduled. If the data indicates mastery, a follow-up session should occur the following day to check for retention. If the skill is demonstrated without demonstration, consider this as evidence of skill retention. The student will then be allowed to coach a peer from the Primary Participation group.

If a child(ren) did not demonstrate mastery, schedule an additional session(s). If three teaching sessions do not show mastery has been reached, the child may not be a suitable peer coach and may need to be replaced.

## **BIOGRAPHY OF THE AUTHOR**

Michelle Hathaway is a long-time resident of Maine, living with her husband and three sons. Mrs. Hathaway began working with children with autism in 1995 as an undergraduate student at Guilford College in Greensboro, North Carolina. In 1997, following graduation, Mrs. Hathaway returned to Maine where she started the Margaret Murphy Center for Children (MMCC) in Auburn, Maine. Mrs. Hathaway enrolled at the University of Southern Maine in 2000, completing her M.S. in Special Education and her Certificate of Advanced Study in Applied Behavior Analysis. Mrs. Hathaway became a Board Certified Behavior Analyst in 2010 and is certified as a Special Education Teacher and Special Education Consultant. While in graduate school, Mrs. Hathaway continued to expand and develop MMCC services to include a thriving organization that educates nearly 200 children with autism, developmental disabilities and behavioral disorders across the state of Maine and within MMCC's 8 centers. In addition, Mrs. Hathaway is a founding member of ACADIA Academy, overseeing the development of Maine's ninth Charter School, opening in the Fall of 2016.